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With a settled government and increased population, there is no reason why this should not become one of the most prosperous tracts of central Asia.

### GEOGRAPHICAL NOTES.

THE fifth expedition of the Belgian international African association, which started with the view of connecting by a chain of stations the east coast with the interior basin, has returned, the expense proving too great to render the project profitable. The Zanzibar agent of the society has returned to Europe. The efforts of the association at present will probably be confined to the Kongo watershed.

The death of Mirambo, the noted chief of Unyamuezi, is confirmed. His principal rival, Kapira, is also dead. The power of the former was so great an element in securing peace and security of travel, that his death seems a public misfortune. The son of M'tesa is reported to have succeeded his father. He is young and intelligent, and favorably disposed toward Europeans. He was for several years a pupil of Father Levinhac, recently consecrated bishop of Uganda.

Lieut. Hovgaard intends to visit the east coast of Greenland next year at the expense of the Danish government. Herr August Gamel, the owner of the steamer *Dimfna*, has placed it at his disposal. The majority of copies of the work known as '*Meddelelse om Grönland*,' published by the Danish government, and which received one of the annual medals of the Paris société de géographie, were burned in the recent conflagration at the palace of Christianborg in Copenhagen.

Caspari has reported on the station of Sheik Said at Cape Bab-el-Mandeb, claimed by France. It appears to be a desert spot, with an exposed roadstead, severe heats, no vegetation, and the fresh water scarce and bad. There is a shallow lagoon containing many fish, out of which a small community of Arabs manage to gain a living. Altogether it would seem a most unpromising spot for a European colony.

La société des études historiques, Paris, offers a prize of one thousand francs, or a medal of equal value, to the author of the best memoir on the following subject: "A study of the consequences, from the point of view of political economy, of the new relations between Europe and West America, eastern Asia and Polynesia, which would follow the completion of the Panama canal." For conditions, competitors should address M. L. Racine, administrator of the society, 62 boulevard de Courcelles.

Assan Khan Sanieduleh, minister to the shah of Persia, has sent to the Paris geographical society a memoir on the district and town of Maybaud, another on the region of Kelat-i-Nadiri, with a map, and the first volume of a series of three, to be devoted to Khorassan, all in the Persian language.

A steamer called the *Industrie*, of 513 tons, has arrived at Cologne, March 18, being the first vessel to enter that port direct from an ocean voyage. It is

expected that she will prove the forerunner of an important commerce.

The missionaries of Uzigay in the equatorial lake region of Africa report that the use of a sort of beer made of bananas has been used by them with excellent results as a prophylactic against malarial fevers. Owing, as they suppose, to its use, they have enjoyed in that pestilent region the best of health. The matter seems worthy of investigation.

Teisserenc de Bort writes, that, midway between Khurd-Rumed and Beresof, his party had discovered a depression called by the inhabitants *Sebkha Zeita*, six or eight kilometres in extent, which forms a lake during the wet season. It is surrounded by an almost circular chain of dunes, between which and the lake are found very numerous chipped flints and other vestiges of man, including hundreds of hearths where the stones show traces of fire.

### ASTRONOMICAL PROGRESS IN 1884.

PROFESSOR NEWCOMB contributes to vol. ix. of Appletons' annual cyclopaedia, just published, an interesting article on 'Astronomical phenomena and progress during the year 1884.' In observatories and instruments, he notes the completion of the Lick observatory, with the exception of its equatorial; and the mounting of the great telescopes at the University of Virginia and at Pulkowa, the latter of thirty inches aperture, the largest refractor yet made. In solar physics, Langley's Mount-Whitney work receives first attention, and the tardy appearance of the sun-spot maximum in 1884 (one or perhaps two years behindtime) is remarked. From recent determinations of the velocity of light, the solar parallax is found to be 8.794", and the corresponding distance of the sun, in round numbers, 93,000,000 miles, "which is not likely to be altered by much more than 100,000 miles by any future discoveries."

Recent observations on Jupiter appear to show that the period of rotation at its equator is more than five minutes less than in the latitude of the great red spot, — a result which is of great interest, as tending to confirm the suspected resemblance of that planet to our sun. Saturn, during the winters of 1884, 1885, and 1886, is in an unusually favorable situation for observation; and we may expect valuable testimony on the disputed variability of the rings, and on the many interesting physical phenomena which the planet presents. The asteroids and comets of the year receive due notice. Attention is called to Professor Pickering's inventions in photometry, which have provided us with a standard catalogue of the magnitudes of over four thousand stars, — 'Harvard photometry.' By a very elaborate calculation, Professor Oppolzer has investigated the question whether the excess of the moon's apparent acceleration above its computed value may not arise from the mass of the earth being gradually increased by the falling of meteors upon its surface. He concludes that a precipitation of cosmic dust of about

one-thousandth of an inch in a year would account for the difference. In stellar parallax we find the important work of Gill and Elkin at the Cape of Good Hope, and the surprising results of the Pulkowa observations, which, if confirmed, will place the star Aldebaran among the three or four nearest of the fixed stars. Professor Newcomb mentions the spectroscopic investigations of the motions of stars in the line of sight, observations of the companion of Sirius, cataloguing stars by photography, and the red sunsets, and concludes with a review of the conclusions of the International meridian conference, and a notice in regard to the communication of astronomical discoveries, and the recently founded Watson and Draper astronomical prizes.

### WATER-SUPPLY FOR NEW YORK.

MR. J. T. FANNING, who is well and favorably known to the profession by his valuable treatise on water-supply engineering, prefaces a study of the present and future water-supply of New York<sup>1</sup> by a couple of pages, giving a brief historical summary of the establishment of the Croton aqueduct, which at its opening in 1842 supplied the city, then having a population of less than one-third of a million, with an average of twelve million gallons of water daily. The history of the rapid increase in the consumption of water, next given, shows that by 1875 the demand for water had reached the limiting capacity of the aqueduct, which amounted to a daily average of ninety-five million gallons. Since 1875 "the public fountains have ceased, one after another, to flow. Drinking-fountains for either man or beast have been almost unknown of late in the public streets. Meters have been applied in charitable institutions, as well as in manufacturing establishments, and the most stringent measures taken to prevent waste, and at times most urgent appeals made to save the consumption, that the evils of an approaching water famine might be lessened." The New-York water department estimates that the works now in progress will draw from the Croton watershed a daily average of two hundred and fifty million gallons (see *Science*, No. 124).

On the basis of numerous statistical tables given in the report, as to increase of population and of water-consumption, the attempt is made to estimate the period during which these new works will provide a sufficient supply for the city, and for the population which must draw its water from the city supply.

In making this estimate, the needs of the city are taken to include a sufficient supply for the ordinary uses to which water is applied in our larger cities, not excluding those uses in manufacturing establishments for the lack of which business must be curtailed, or settle elsewhere.

The conclusion reached in this report is, that, before

<sup>1</sup> Report No. 2, on a water-supply for New York and other cities of the Hudson valley. By J. T. FANNING, C.E. New York, 1884. 36 p., 3 maps. 8°.

the year 1898, the regular increase of population and the expansion of business will require the whole of the projected average supply of two hundred and fifty million gallons *per diem*, and that before 1930 four times that amount may be needed.

Having thus determined that the total available supply from the Croton watershed cannot in any event answer probable legitimate demands for much more than a single decade, the author, in looking to other gathering-grounds from which to draw a sufficient supply for future needs, regards the head waters of the Hudson River in the Adirondack region as the most available source, provided the city is to be supplied by gravitation with water of unexceptionable quality, in adequate quantities, and at a pressure due to a head of two hundred feet or more above tide water, such as will carry water to the upper floors throughout the city.

Careful surveys show that a canal sixty feet wide, thirteen feet deep, and somewhat over two hundred miles long, would carry five hundred million gallons of water *per diem* from near Fort Edward to New York. The estimated cost of this conduit is nearly thirty million dollars; and the auxiliary structures, storage-basins, necessary tunnelling, etc., twenty-five million dollars: total, fifty-five million dollars. It is proposed that the canal run on the highlands east of the Hudson River at an initial elevation of three hundred and fifty feet above tide water, and that this source be also used as the water-supply for the cities and towns on both sides of the river, between Albany and New York, having, according to the census of 1880, an aggregate population of quarter of a million souls, besides the million and three-quarters in New York and Brooklyn. Detailed surveys and the statistics of annual rainfall show that the Adirondack watershed is capable of furnishing an average of nearly fourteen hundred million gallons daily without trespassing upon the river-supply available for canal and manufacturing interests.

This grand and beneficent project must evidently, before many years, be put in process of actual construction. It is greatly to be desired that the state of New York should, as soon as may be, put a stop to the destruction of the Adirondack forests, and reserve a principal part of that region for a park, thus preserving this region as a sanitarium for the commonwealth, as well as the source of a beautiful supply of good healthful water for the entire Hudson valley.

### COMPARISON OF THE SKULLS OF ASSASSINS AND MEN OF NOTE.

THE material for Dr. N. Bagenoff's studies of the heads of assassins and distinguished persons (*Bull. soc. anthrop. de Paris*) was of two kinds, — first, fifty-five heads of assassins; second, nineteen heads of distinguished persons. This last series seeming too small, he prepared another, composed of the heads of twenty-five noted living men. His main studies were carried on by means of the cephalometer of Anthelme,